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ABSTRACT

This paper describes the "Urban School Key Indicators of Science and Mathematics Education," a four-volume publication designed to visualize the educational reform progress of 21 urban school districts in the National Science Foundation's Urban Systemic Initiative (USI) program launched in 1994. The USI program is intended to be a catalyst for large-scale educational change affecting standards, curriculum, assessment, professional development, partnerships, and convergence of intellectual and fiscal resources, with constant attention to improving student achievement. The "Urban School Key Indicators of Science and Mathematics Education" culminates the first year and a half effort to collect and compile multiple-year reform progress data across the 21 sites using the Key Indicator Data System, which includes quantitative and qualitative data templates. Quantitative data include information on student demographics, academics, test scores, and teacher professional development and district and USI fund utilization. The Urban School Key Indicators report presents the quantitative and qualitative multiple-year reform data in a condensed graphic and text format. It provides a rationale for establishing a consortium for the urban school key indicators data warehouse designed to assist urban school districts, stakeholders, and research communities. (SM)

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URBAN SCHOOL KEY INDICATORS OF SCIENCE AND MATHEMATICS EDUCATION FOR THE NATIONAL SCIENCE FOUNDATION'S URBAN SYSTEMIC INITIATIVE PROGRAM

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Paper Presentation submitted to
SIG: School Indicators and Profile

Urban School Key Indicators of Science and Mathematics Education For the National Science Foundation's Urban Systemic Initiative Program

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Background and Objective

The "*Urban School Key Indicators of Science and Mathematics Education*" is a four-volume publication designed to visualize the educational reform progress of 21 urban school districts in National Science Foundation's Urban Systemic Initiative (USI) program launched in 1994. Each urban school district is implementing a five-year concerted system-wide effort to promote standards-based reform focused on mathematics, science, and technology (MST). The USI program has been designed as a catalyst for large-scale educational change affecting standards, curriculum, assessment, professional development, partnerships, and convergence of intellectual and fiscal resources, with constant attention to improving student achievement.

Over the course of its three SI programs (State, Urban, and Rural), NSF has developed a theoretical structure for systemic reform that is based on six "drivers" including four process drivers (curriculum, policy, resources, and broad-based support) and two student outcome drivers (student achievement, improvement of historically underserved), as well as a number of cross-cutting issues such as equity, quality, scaling up, coordination and organization.

Systemic Research, Inc. received a three year grant, entitled "*How Reform Works: An Evaluative Study of NSF's Urban Systemic Initiatives,*" to explore the impact of the USI program on student achievement and the learning infrastructure in urban school districts by examining causal inferential models among the process drivers (independent variables) and outcome drivers (dependent variables). Our evaluative study team published and disseminated the first two monographs to identify critical variables in education reform and classroom practices (Ref. 1 & 2).

Methodology and Framework

The *Urban School Key Indicators of Science and Mathematics Education* culminates the first year and a half effort to collect and compile multiple-year reform progress data across 21 USI sites using the Key Indicator Data System (KIDS) designed and implemented by Systemic Research. KIDS consists of two electronic data collection instruments: quantitative data template (K-1) and qualitative data template (K-2).

K-1 consists of 11 sections of input templates for multi-year data collection:

- Table A: District-Wide Student Demographics and Selected Statistics
- Table B: Math and Science Gate-Keeping Course Enrollment & Completion
- Table C: 12th Grade Students Graduation Data Summary
- Table D: High School Graduation Requirements
- Table E: AP Mathematics and Science Test Results
- Table F: SAT-I : Mathematics and Verbal Reasoning Test Results
- Table G: ACT: Mathematics, Science Reasoning, and English Test Results
- Table H: Assessment Test Results
- Table I: Mathematics/Science Teacher Certificates and Professional Development
- Table J: District and USI Fund Utilization
- Table K: Definition of School Statistics Terminologies

Table H has been tailored to each school district to accommodate selected types of mathematics and science assessment instruments. Our evaluative study team established collaborative research agreements with the Educational Testing Service (ETS), the College Board, and ACT, Inc., respectively, and obtained six year of SAT-I, AP, and ACT test results directly from each agency.

K-1 is a Microsoft ® Excel-based, menu-driven, user-friendly instrument designed to provide automatic data verification and output generating capabilities. The second part of K-1 automatically generates a series of output figures linking longitudinal input tables for review and analysis purpose.

K-2 is another Microsoft ® Excel-based instrument designed to collect qualitative key indicators over the project period which complements K-1. K-2 includes descriptive questionnaires regarding the SI drivers: policy, standards-based curriculum and instruction, professional development, standards-based assessment, district leadership and partnerships, and accountability. Our evaluative study team initiated K-2 data collection by extracting available data from each site's Performance Effectiveness Reviews, Annual Reports, and Common Data Elements (CDE) submitted to NSF.

- Cohort/Scale-up Approach
- Primary Decision Making Body for Various School District Agenda
- Policies Promoting Equal Access by All Students in High Quality Education
- Policies Impacting the Enrollment of Students in Challenging Math and Science Courses
- Policies Relevant to Curriculum
- Standards-based Curriculum and Instruction
- Policies Relevant to Teacher Qualifications
- Professional Development Policies and Practices
- Policies Relevant to Standards-based Assessments
- USI Leadership, Governance, and Management
- Partnerships

To promote collaborative research environments and to enhance data integrity, our evaluative study team sponsored an annual KIDS workshop inviting USI project directors, data managers, and local evaluators along with NSF program directors. After many iterations of data collection between each USI site and our study team, 21 sets of K-1 and K-2 could finally merged into a four-volume, 490 page report, "*Urban School Key Indicators of Science and Mathematics Education.*" The first three volumes present the progress of 21 USI districts by cohort including program data, project summary, and project goals along with web site information:

- Volume I – Cohort 93 (Baltimore, Chicago, Dallas, Detroit, El Paso, Miami-Dade, New York, and Phoenix)
- Volume II- Cohort 94 (Cleveland, Columbus, Fresno, Los Angeles, Memphis, New Orleans, and Philadelphia)
- Volume III – Cohort 95 and 97 (Milwaukee, St. Louis, San Antonio, San Diego, Atlanta, and Jacksonville)

The Volume IV Key Indicator Report presents USI overall progress data by aggregating student achievement data (gate-keeping course enrollment and completion, SAT-I, AP, ACT), 12th grade graduation data, assessment data, and teacher and professional development data. The overall progress report also includes tabulation of math and science assessment instruments, graduation requirements, and district and USI fund allocations.

Conclusion

The "*Urban School Key Indicators of Science and Mathematics Education*" has been published as a component of the NSF granted evaluative study "How Reform Works: An Evaluative Study of NSF's Urban Systemic Initiatives." The report has been disseminated by full-color hard copy, as well as a CD-ROM version and a PDF-based web version.

Our evaluative study team uses the Urban School Key Indicator report as a first stepping-stone to explore the inferential causal model of the best practices in urban school reform. The Key Indicator report is unique and one-of-a-kind in terms of presenting both quantitative and qualitative multiple-year reform data in a condensed graphic and text format. The Urban School Key Indicator report was fully utilized by NSF program directors, USI PI/PDs, data managers, local evaluators, as well as other urban SI research groups. The Urban Key Indicators report provides a rationale to establish a consortium for the urban school key indicators data warehouse designed to assist urban school districts, stakeholders, and research communities.

1. Ware, M., Richardson, L., & Kim, J. (1999). *What Matters in Urban School Reform*. Study Monograph No. 1- "How Reform Works: An Evaluative Study of NSF's Urban Systemic Initiatives." Norwood, MA: Systemic Research, Inc.

2. Blank, R., Kim, J., & Smithson, J. (2000). *Survey Results of Urban School Classroom Practices in Mathematics and Science: 1999 Report*. Study Monograph No. 2- "How Reform Works: An Evaluative Study of NSF's Urban Systemic Initiatives." Norwood, MA: Systemic Research, Inc.